NAMING AMERICAN HYBRID OAKS.

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Plates I–III.

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Two methods of designating hybrids are sanctioned by the International Botanical Congresses of Vienna and Brussels—employment of a compound trivial name composed of the names of the two parent species, separated by the conventional × sign, or use of a new trivial name in a binomial preceded by the same conventional symbol. Taking a now well-known oak hybrid as illustration, the first method would cause it to be referred to as either *Quercus alba* × *Prinus* or *Q. Prinus* × *alba,* and the second as × *Q. Saulii.*

Various qualifications of the first procedure have been proposed or put in practice now and then to show which is the male and which is the female parent species, or to indicate by use of the symbol > or < which parent is more closely resembled by the hybrid. The first of these is possible only when hybridization has been effected artificially or when the mother plant is known, so that uniformity in its use and therefore general comparability is impossible. As a fact no effort has been made to indicate the resemblance to either parent in the majority of cases; nor is it likely that different observers would reach identical conclusions in this respect for many specimens of hybrids because, among other things, no agreement exists as to which of several non-concordant characters is to form the basis of judgment. Amplification of this composite name method permits the similar designation of secondary and tertiary or higher hybrids, but in an increasingly cumbersome way, so that the polynomial indication of such forms becomes very quickly a confused symbolically abbreviated description rather than a name. Even in the simple case of such a first cross as has been taken for illustration, every rectification of error in the names applied to

either parent species entails a change in each of the hybrid designations. For instance, if Professor Sargent's conclusion is to be accepted[1] that the specific name *Prinus* must be applied to the cow oak, and not to the rock chestnut oak, so that the name *montana* is to be restored for the latter, the permissible designations of this hybrid at once change to *Q. alba* × *montana* and *Q. montana* × *alba*. This sort of double correction must be applied every time that the name of either parent is dragged into the lamentable whirlpool of nomenclatorial debate, which in this particular branch can be made hopelessly confused and voluminous by even a fraction of the permutations that are likely to be made.

Binomial designation of each hybrid—simple, secondary or of a higher order—offers escape from some of the difficulties attending the multiple-name method. A binomial applied to a hybrid at once falls under the procedure customary with ordinary specific binomials, and no matter what changes the trivial names of the parent species may undergo its own applicability rests solely on the basis of priority. In case of a change of generic names it is merely dragged about with the species it is derived from, and in the rare instances of what are or may come to be considered bigeneric hybrids it does not itself suffer change in the new connection and may cease to be dragged about, even, so soon as such hybrid genera are given uniformly definite names of their own, such, for instance, as *Lælio-Cattleya,* applied to the hybrid between the orchid genera *Lælia* and *Cattleya*. Its position is even more stable than that of varietal or subspecific trivial names, the treatment of which prescribed by international conventions is not followed uniformly in different countries or by different writers.

One inherent defect in such binomial designation of hybrids requires serious consideration. The scientific name of a species or variety stands for an assemblage of individuals no two of which may be alike but which possess characters of agreement by which they differ from other assemblages of individuals to which they are related in the genus they represent as species or in the species they represent as varieties: it stands clearly for a morphological concept. In contrast with this, the binomial applied to a hybrid ap-

[1] *Rhodora.* 17: 40, 1915.

pears to be an expression of parentage, which may be supported by morphological characters when its individual representatives meet this test of mutual resemblance and difference from other named assemblages, but which falls to the ground when they differ so much among themselves as to make a diagnostic description impossible. This is the case frequently, and the now commonly known Mendelian laws of segregation prepare one for the expectation that in some cases, at least, purely dominant and recessive seedlings of a known hybrid will be no longer other than reversions to one or other parent form if raised from self-fertilized seeds.

Obviously the application of binomials to hybrids is in a different category from the use of such names for species or varieties: it is not a matter of taxonomy, the stability of which is generally recognized as dependent upon a morphological basis: but a phase of nomenclature, a means to the end of convenient reference to the various kinds of things. There is so much to be said in its favor that botanists are coming to employ it generally. A special difficulty and source of confusion inherent in the designation of hybrids under any method lies in the fact that their parentage is more commonly assumed from their characters or inferred from circumstantial evidence than actually known. Whatever the method, synonymy must grow with every mistake made in this respect: but the remedy for this lies with those who are responsible for reporting the parentage of supposed hybrids, as, elsewhere, it lies with those who are responsible for segregating species or other formal groups.

Such a case as that of Bartram's oak, × *Quercus heterophylla,* presents an interesting aspect of the question. This was named by Michaux as though it were an ordinary species. Subsequent botanists have regarded it as a cross between *Q. Phellos* and *Q. velutina.* The behavior of seedlings from trees taken to be representative of *heterophylla* has led to the conclusion that these were a cross between *Q. Phellos* and *Q. rubra.* On this evidence, they have been given by Schneider the binomial × *Q. Hollickii.* If the purpose were to name the idea of a possible cross, this would obviously be necessary, since the idea of the cross between *Q. Phellos* and *Q. velutina* would have been called × *Q. heterophylla.* As a

matter of fact, the name was given to a definite plant form, and follows that form whatever changes of theory or knowledge its parentage may undergo. For this reason, × *Q. Hollickii* passes into synonymy as a mere equivalent of the earlier name × *Q. heterophylla;* and the latter does not in any way affect the naming, on its own merits, of a hybrid between *Phellos* and *velutina* whenever that is brought to light. Such a plant is believed to be that which is here called × *Q. dubia,* though some doubt attaches to its parentage. If an error has been made, × *Q. dubia* in its turn will still stand for this form if it can be identified, which is less certain than for *heterophylla;* and a real hybrid between *Phellos* and *velutina,* if ever found, will finally be given a definite name quite irrespective of these efforts. A somewhat comparable case is afforded by × *Q. runcinata.*

In my study of the American oaks, briefly summarized recently,[2] I have had to account for a considerable number of hybrids, some of which have been described or even figured, occasionally as species in the ordinary use of the term, and some of which have been made known by reference to specimens more or less generally distributed by their collectors. No collective treatment of these forms has ever been made: they are not to be found severally assembled in any herbarium that I have seen, being inserted sometimes under one parent, sometimes under the other—now under one name, now under another for the parental species—and exceptionally under binomials of their own. The following table accounts for everything of this description that I have encountered either in herbaria or in publications on *Quercus;* it is published partly to call attention to the general desirability, as I see it, of designating hybrids by binomials, and partly to facilitate a workable assemblage of oak materials in herbaria.

Lest misapprehension arise, it should be stated that what is here called *Q. rubra* is the common red oak of the eastern United States; though, following Professor Sargent's suggestion of a current misidentification, Mr. Ashe proposes replacing this name by *Q. maxima,* and using *rubra* for what is here called *Q. cuneata*—the *digitata* or *falcata* of many writers.

[2] Proc. Nat. Acad. Sci. **2**: 626. 1916.

Quercus alba × *bicolor* = × Q. Jackiana
× *macrocarpa* = × Q. Bebbiana
× *montana* = × Q. Saulii
× *Muehlenbergii* = × Q. Deami
× *prinoides* = × Q. Faxoni
× *Prinus* = × Q. Beadlei
× *stellata* = × Q. Fernowi

Q. arizonica × *grisea* = × Q. organensis

× **Q. Ashei** n. nom. (*Q. Catesbæi* × *cinerea*)

× **Q. Beadlei** n. nom. (*Q. alba* × *Prinus*)

× Q. Bebbiana Schneider (*Q. alba* × *macrocarpa*)

× Q. Benderi Baenitz[3] (*Q. coccinea* × *rubra*)

Q. bicolor × *alba* = × Q. Jackiana
× *macrocarpa* = × Q. Schuettei

× **Q. blufftonensis** n. nom. (*Q. Catesbæi* × *cuneata*)

× Q. Brittoni Davis (*Q. ilicifolia* × *marilandica*)

× **Q. caduca** n. nom. (*Q. cinerea* × *nigra*)

× **Q. carolinensis** n. nom. (*Q. cinerea* × *marilandica*)

Q. Catesbæi × *cinerea* = × Q. Ashei
× *cuneata* = × Q. blufftonensis
× *nigra*[4] = × Q. Walteriana

Q. cinerea × *Catesbæi* = × Q. Ashei
× *cuneata* = × Q. subintegra
× *laurifolia* = × Q. sublaurifolia
× *marilandica* = × Q. carolinensis
× *nigra* = × Q. caduca
× *? velutina* = × Q. podophylla

Q. coccinea × *ilicifolia* = × Q. Robbinsii
× *palustris* = Q. ellipsoidalis f.,—not a hybrid.
× *rubra* = × Q. Benderi

[3] Resemblance to either parent is here indicated by use of the trinomials × *Q. Benderi coccinoides* and *Q. Benderi rubroides,* and one of the many forms possible of the former is indicated in the name × *Q. Benderi coccinoides* f. *volvato-annulata.*

[4] *Q. sinuata* Walter, usually taken to have designated this hybrid, is held to apply properly to what Small has called *Q. austrina.*—Ashe, *Proc. Soc. Amer. Foresters.* 11: 89. 1916.

Q. cuneata × *Catesbæi* = × Q. blufftonensis
× *cinerea* = × Q. subintegra
× *Phellos* = × Q. subfalcata
× *velutina* = × Q. Sudworthi

× **Q. Deami** n. nom. (*Q. alba* × *Muehlenbergii*)

Q. Douglasii × *Garryana*

What has been taken for, possibly, this cross scarcely appears to be more than *Q. Douglasii.*

× Q. DUBIA Ashe (*Q. Phellos* × *? velutina*)

Q. dumosa × *Engelmanni*

Specimens distributed for this hybrid scarcely appear to be more than *Q. dumosa.*

Q. ellipsoidalis × *velutina* = × Q. palæolithicola

Q. Emoryi × *grisea*
× *pungens*

Neither of these appears to show evidence of *Q. Emoryi* as a parent.

Q. Engelmanni × *dumosa* (See *Q. dumosa*)

× **Q. exacta** n. nom. (*Q. imbricaria* × *palustris*)

× **Q. Faxoni** n. nom. (*Q. alba* × *prinoides*)

× **Q. Fernowi** n. nom. (*Q. alba* × *stellata*)

Q. Garryana × *Douglasii*

See note under *Q. Douglasii.*

Q. georgiana × *marilandica* = × Q. Smallii

× **Q. Giffordi** n. nom. (*Q. ilicifolia* × *Phellos*)

Q. grisea × *arizonica* = × Q. organensis
× *Emoryi* (see note under *Q. Emoryi*)

× Q. HETEROPHYLLA Michaux (*Q. Phellos* × *rubra*)

× **Q. Hillii** n. nom. (*Q. macrocarpa* × *Muehlenbergii*)

× Q. HOLLICKII Schneider = × Q. heterophylla

Q. ilicifolia × *coccinea* = × Q. Robbinsii
× *marilandica* = × Q. Brittoni
× *Phellos* = × Q. Giffordi
× *velutina* = × Q. Rehderi

Q. imbricaria × *marilandica* = × Q. tridentata
× *palustris* = × Q. exacta
× *rubra* = × Q. runcinata
× *velutina* = × Q. Leana

Q. Kelloggii × *Wislizeni* = × Q. moreha
× Q. JACKIANA Schneider (*Q. alba* × *bicolor*)
Q. laurifolia × *Catesbæi* = × Q. Mellichampi
× *cinerea* = × Q. sublaurifolia
× Q. LEANA Nuttall (*Q. imbricaria* × *velutina*)
× Q. LUDOVICIANA Sargent (*Q. Pagoda* × *Phellos*)
Q. macrocarpa × *alba* = × Q. Bebbiana
× *bicolor* = × Q. Schuettei
× *Muehlenbergii* = × Q. Hillii
Q. marilandica × *cinerea* = × Q. carolinensis
× *georgiana* = × Q. Smallii
× *ilicifolia* = × Q. Brittoni
× *imbricaria* = × Q. tridentata
× *nigra* = × Q. sterilis
× *Phellos* = × Q. Rudkini
× **Q. Mellichampi** n. nom. (*Q. Catesbæi* × *laurifolia*)
Q. montana[5] × *alba* = × Q. Saulii
× Q. MOREHA Kellogg[6] (*Q. Kelloggii* × *Wislizeni*)
Q. Muehlenbergii × *alba* = × Q. Deami
× *macrocarpa* = × Q. Hillii
Q. nigra × *Catesbæi* = × Q. Walteriana
× *cinerea* = × Q. caduca
× *marilandica* = × Q. sterilis
× **Q. organensis** n. nom. (*Q. arizonica* × *grisea*)
Q. Pagoda[7] × *Phellos* = × Q. ludoviciana
× **Q. palæolithicola** n. hybr. (*Q. ellipsoidalis* × *velutina*)

A form in foliage resembling *Q. coccinea,* or the *coccinea*-like *ellipsoidalis,* with fruit of the larger *ellipsoidalis* or *coccinea* type, but buds large and hairy as in *velutina.*—The type from Winnebago County Illinois (*Bebb*).

Q. palustris × *coccinea* = Q. ellipsoidalis f.,—not a hybrid.
× *imbricaria* = × Q. exacta
× *rubra* = × Q. Richteri

[5] The rock chestnut oak, commonly called *Q. Prinus.*

[6] Commonly written *Q. Morehus,* but evidently an adjective name based on Moreh—the Scriptural "land of Moriah," and consequently to be brought into agreement of gender with the feminine tree name *Quercus.*

[7] Though *pagodæfolia,* applied by Ashe to this species, has priority in varietal use, it gives way under the international rules to Rafinesque's specific name *Pagoda.*

Q. Phellos × *cuneata* = × Q. subfalcata
× *ilicifolia* = × Q. Giffordi
× *marilandica* = × Q. Rudkini
× *Pagoda* = × Q. ludoviciana
× *rubra* = × Q. heterophylla
× *? velutina* = × Q. dubia

× **Q. podophylla** n. nom. (*Q. cinerea* × *? velutina*)

This is *Q. petiolaris* Ashe, a preoccupied name.

× **Q. Porteri** n. nom. (*Q. rubra ?* × *velutina*)

Q. prinoides × *alba* = × Q. Faxoni

Q. Prinus[8] × *alba* = × Q. Beadlei

Q. pungens × *Emoryi* (See note under *Q. Emoryi*)

× **Q. Rehderi** n. nom. (*Q. ilicifolia* × *velutina*)

× Q. Richteri Baenitz (*Q. palustris* × *rubra*)

× **Q. Robbinsii** n. nom. (*Q. coccinea* × *ilicifolia*)

Q. rubra × *coccinea* = × Q. Benderi
× *imbricaria* = × Q. runcinata
× *palustris* = × Q. Richteri
× *Phellos* = × Q. heterophylla
× *? velutina* = × Q. Porteri

× Q. Rudkini Britton (*Q. marilandica* × *Phellos*)

× Q. runcinata Engelmann (*Q. imbricaria* × *rubra*)

The current idea that this is a cross of *Q. cuneata* with *Q. rubra* seems less probable than the parentage here indicated; and *cuneata* does not occur where the type material was collected.

× Q. Saulii Schneider (*Q. alba* × *montana*)

× **Q. Schuettei** n. hybr. (*Q. bicolor* × *macrocarpa*)

A form with twigs of *Q. macrocarpa* and sometimes corky-winged, foliage variously intermediate but prevailingly suggestive of *bicolor,* and subsessile small fruit of the *bicolor* type but with the cups sometimes short-fringed and then resembling small-fruited forms of *macrocarpa.*—Cf. *Proc. Amer. Philos. Soc.* 54. pl. 1.—The type from Fort Howard, Wisconsin (*Schuette,* September 28, 1893).

× **Q. Smallii** n. nom. (*Q. georgiana* × *marilandica*)

Q. stellata × *alba* = × Q. Fernowi

× **Q. sterilis** n. nom. (*Q. marilandica* × *nigra*)

[8] The cow oak, commonly known as *Q. Michauxii.*

× **Q. subfalcata** n. nom. (*Q. cuneata* × *Phellos*)

This is *Q. falcata* Ashe, a preoccupied name.

× **Q. subintegra** n. nom. (*Q. cinerea* × *cuneata*)

× **Q. sublaurifolia** n. nom. (*Q. cinerea* × *laurifolia*)

× **Q. Sudworthi** n. nom. (*Q. cuneata* × *velutina*)

× Q. TRIDENTATA Engelmann (*Q. imbricaria* × *marilandica*)

Q. velutina × *cinerea* = × Q. podophylla
× *cuneata* = × Q. Sudworthi
× *ellipsoidalis* = × Q. palæolithicola
× *ilicifolia* = × Q. Rehderi
× *imbricaria* = × Q. Leana
× *Phellos* = × Q. dubia
× *rubra* = × Q. Porteri

× Q. WALTERIANA Ashe (*Q. Catesbœi* × *nigra*)

Q. Wislizeni × *Kelloggii* = × Q. moreha

From the foregoing list, I have omitted *Q. hemisphærica* Willdenow and *Q. hybrida* Small, as I am frankly in doubt as to their status. The latter (*Q. laurifolia hybrida* Michaux), supposedly a cross between *laurifolia* and *nigra,* seems rather to be a toothed form of *Q. laurifolia.* The former, comprising a great array of intermediates between *Phellos* and *nigra* as well as other forms not otherwise placeable, and in its extremes not distinguishable from these species, though I do not recall that it has been held for a hybrid seems more likely to include some hybrids in its complex than is true of *Q. hybrida.*

THE UNIVERSITY OF ILLINOIS,
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EXPLANATION OF PLATES.

PLATE I. × *Quercus palæolithicola.* Type material in the Field Museum. The upper figure about one third natural size; the lower of natural size.

PLATE II. × *Quercus Schuettei,* about one third natural size. The upper sheet, in the United States National Herbarium, with foliage approaching that of *Q. bicolor;* the lower, in the Field Museum, with foliage and fruit more as in *Q. macrocarpa.*

PLATE III. × *Quercus Schuettei.* The upper figure a representation of the type sheet, in the Field Museum, about one third natural size; the lower a fragment of this specimen, of natural size.